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(54) Abstract Title: Joist hanger

(57) A joist hanger comprises a shoe portion and a flange extending from the shoe, where in use the shoe portion is built into a supporting structure. Preferably the hanger includes integral internal shaping which in use corresponds to a web of an I beam. Alternatively, the hanger may have spacer elements which may be located between the walls of the shoe and the joist (Figure 5) or web of an I beam (Figure 2). Also, the spacer elements and the walls of the shoe may have complementary tongues and grooves to allow the elements to be secured to the walls. The hanger may be lined with an insulating sock. A method of incorporating the hanger into the structure is also claimed.

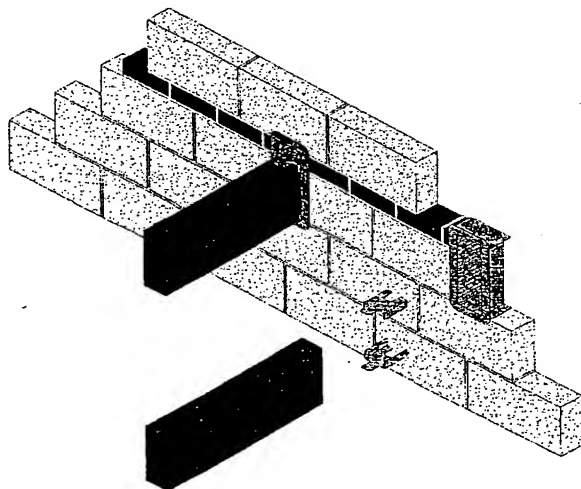


FIG 6

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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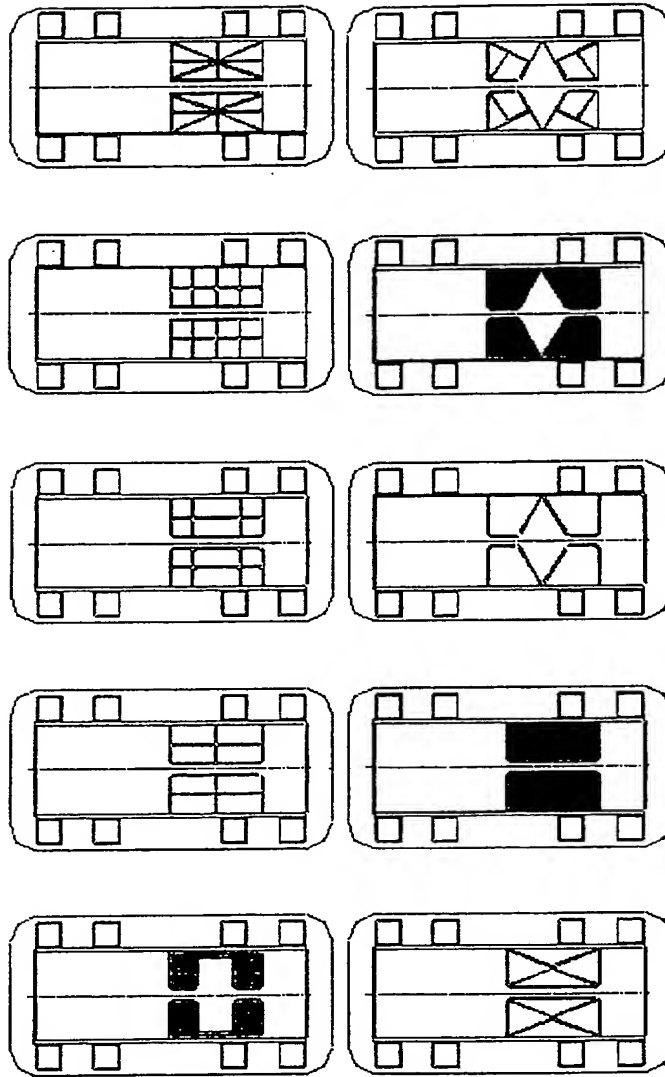


FIG 1

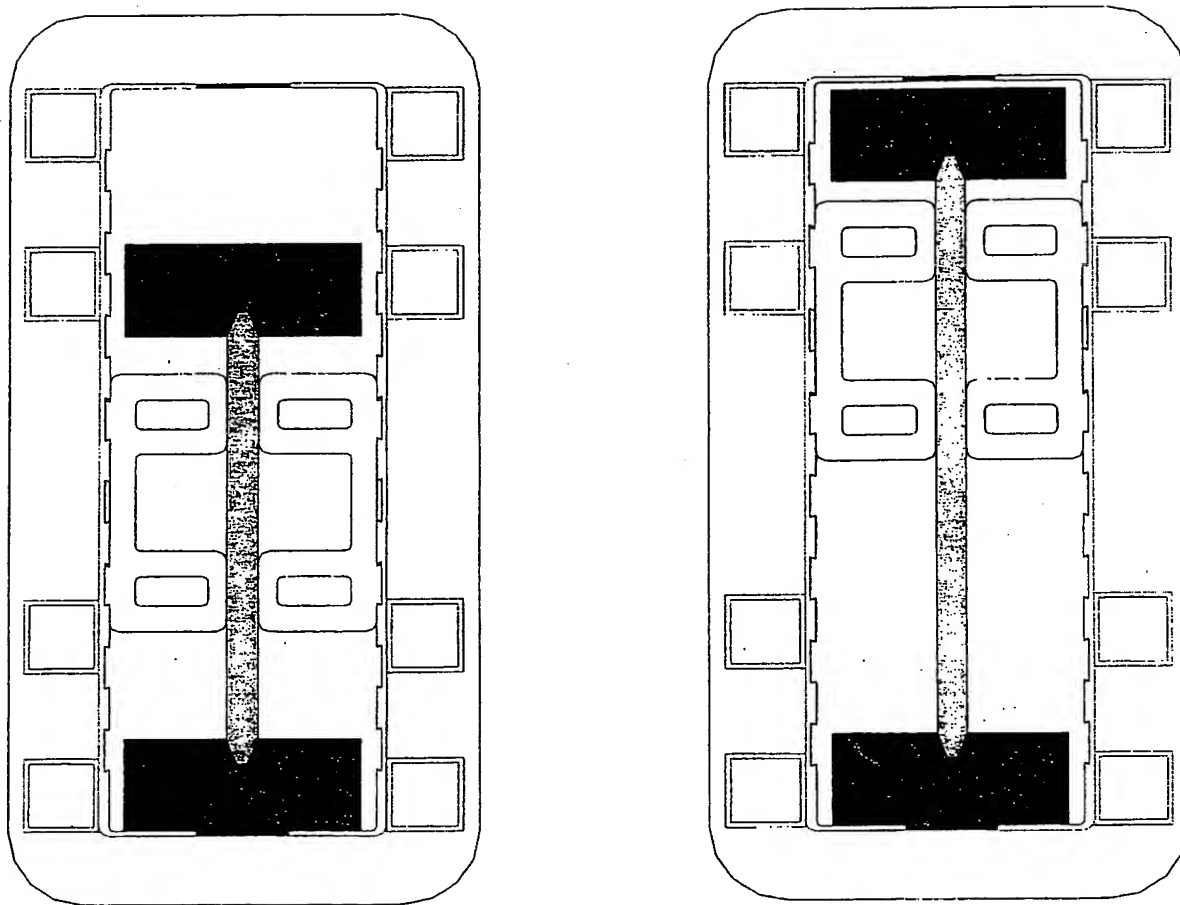


FIG 2

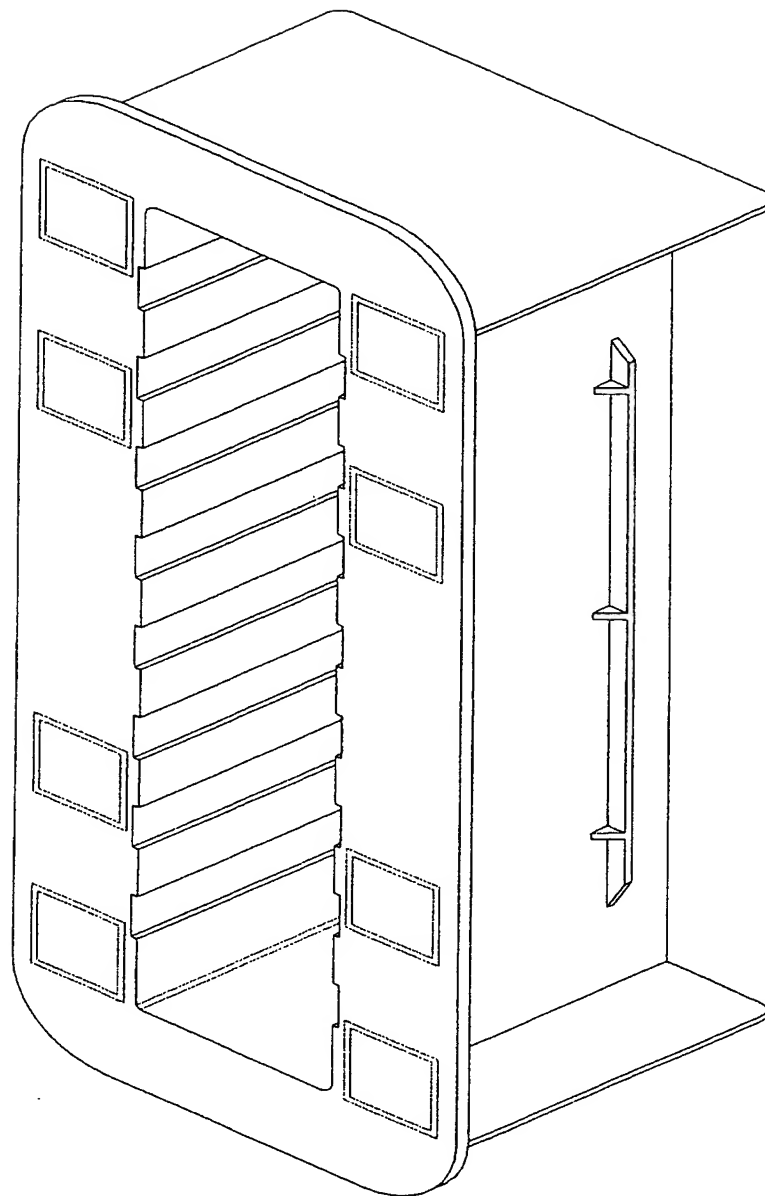


FIG 3

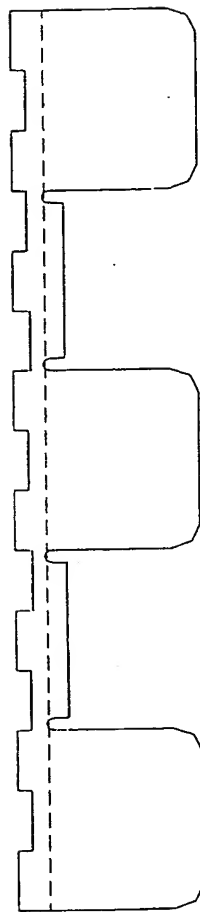


FIG 4

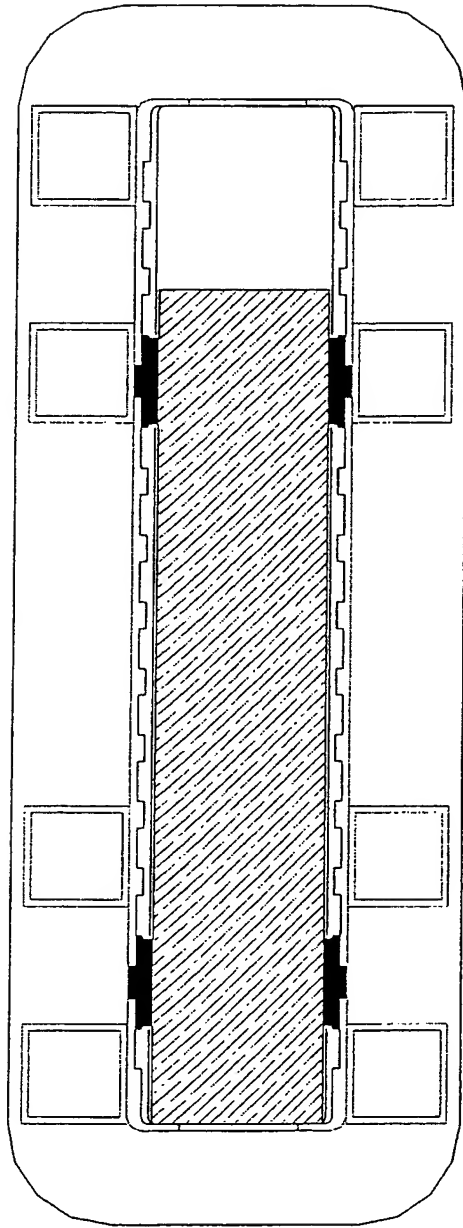


FIG 5

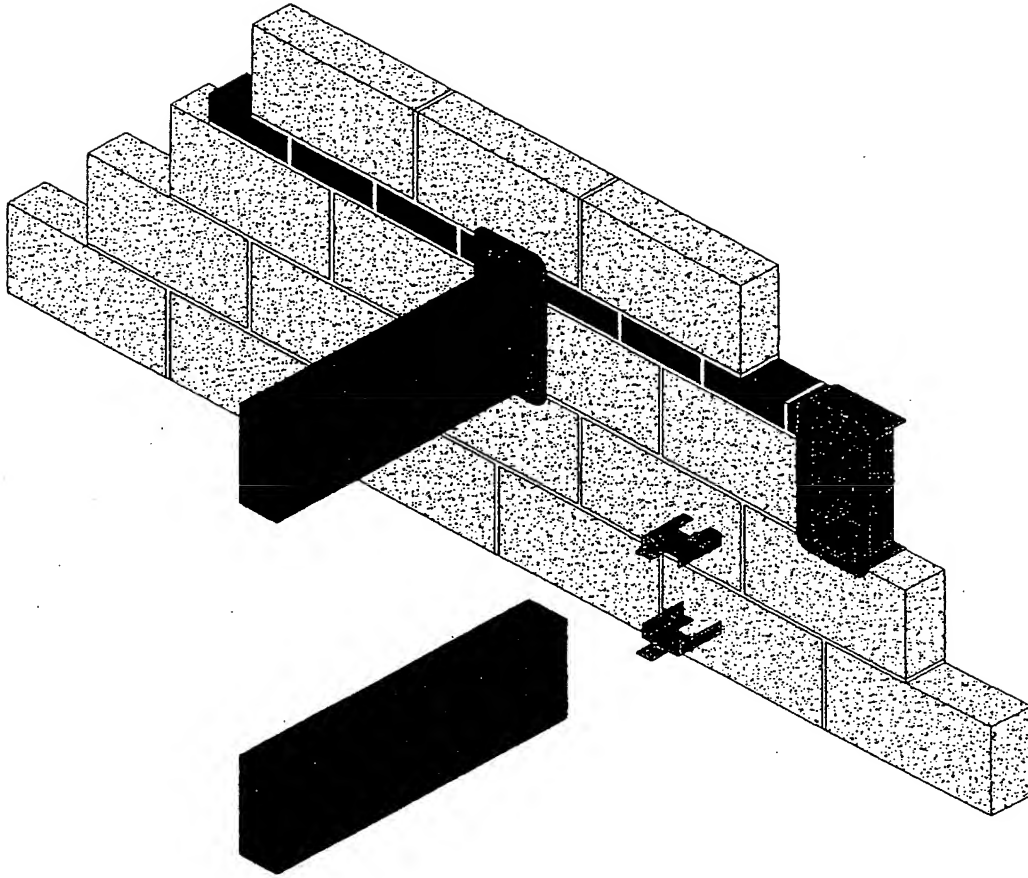


FIG 6

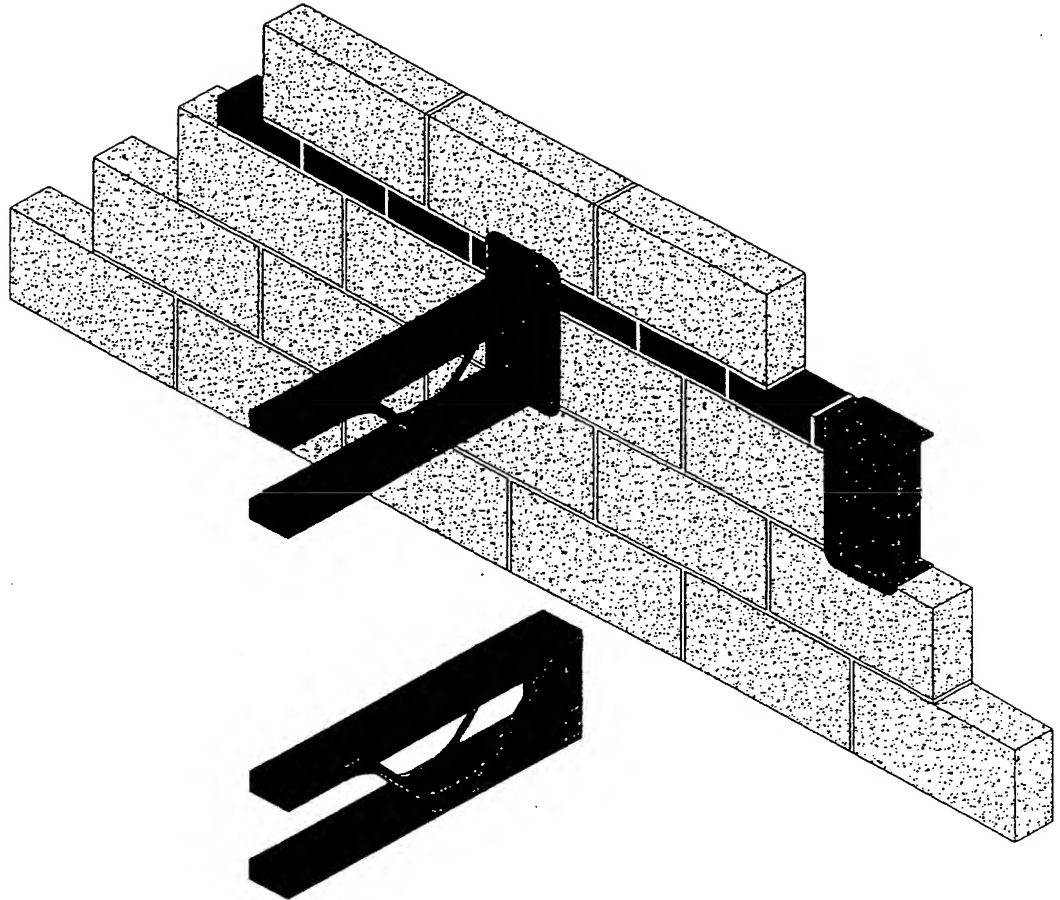


FIG 7



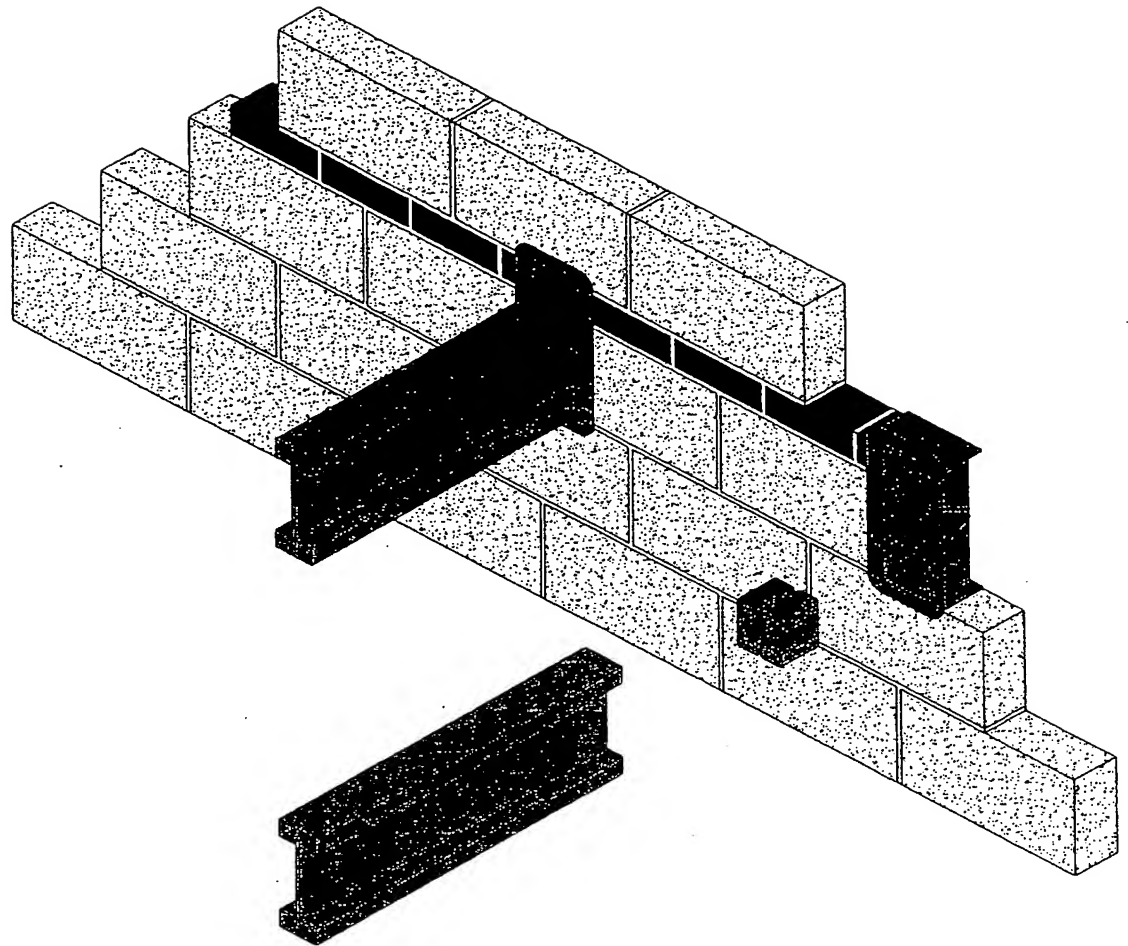
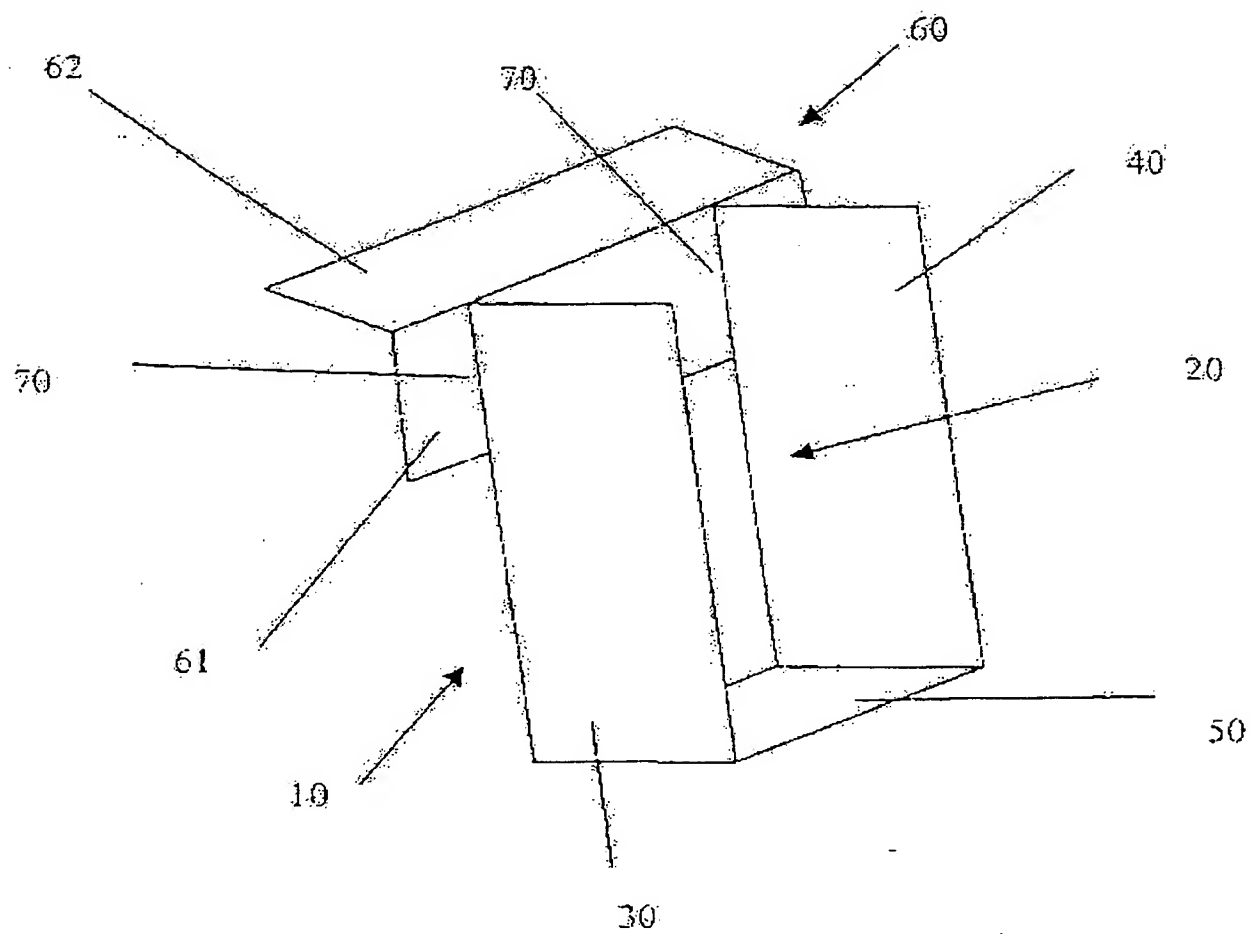


FIG 8



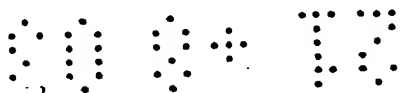
## Joist Hanger

The invention relates to a joist hanger.

5 Traditionally, floor supporting joists were supported directly on a supporting course of brick work. Building regulations introduced in the United Kingdom has brought the requirement of protecting the inner block work leaf against thermal bridging and air leakage, so that the traditional method of building joists into the wall is no longer acceptable.

10 One suggested method of meeting the building regulation requirements is to install joists on hangers. Figure 9 shows schematically such a joist hanger 10, comprising a slot 20 formed by opposed parallel spaced apart vertical surfaces 30, 40 and a joining bottom horizontal surface 50, the vertical faces are joined to an angle bracket 60 by weld lines 70. The angle brackets 60 is arranged such that a first face thereof, 61 is attached to the joist bearing slot work made up out of members 30, 40 and 50, whilst the other face thereof, 62, is a top flange arranged at right angles to the first face 61. In use, the joist hanger 10, is set with the first face 61, which forms a back flange, tight against a supporting block wall, when built to desired level. The top flange 62, is of course at this point resting on a top face of the supporting block wall. The block wall then needs to be built up above the joist hanger with additional courses and, it is found that a minimum of three course of solid block masonry is required above the hanger, with mortar fully cured, before any load at all can be applied to the joist hanger. Having a requirement of building up three extra courses, necessarily means a delay to the point at which joists may be laid, and therefore a delay to the point at which a floor can be installed.

30 Another problem with such types of hangers is that it is imperative to keep tolerances between the joist and the hanger to a minimum to ensure that adequate bearings to the hangers are established. A typical



recommended maximum gap between a back face of the hanger and an outer joist face is 6mm. To ensure that such tolerances are kept to a minimum, it is necessary to supply joists which are individually oversized and then to cut to size on site. This means that wastage occurs, as well as  
 5 additional time and labour costs being incurred.

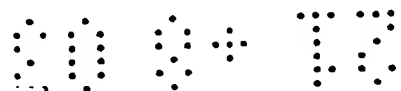
Another problem related to the need for building up a minimum of three courses above the height of the hanger flange prior to any loadings being placed upon it is the fact that delivery of the joists to the hangers  
 10 and access to such hangers becomes more complicated. This can be an important health and safety issue.

A further problem is that changes in moisture content in the air surrounding a timber floor joist lead to changes in moisture content of the  
 15 joist which can, in turn, lead to expansion or contraction of the joist. If a joist adjoining a wall or in a structure shrinks it is desirable to ensure that it does not affect how airtight the wall or structure might be. This problem is particularly important in the light of recent building regulations which provide that air leakage through walls must be limited to limit heat loss  
 20 from buildings.

A further problem seen with known products is that a different size of hanger is required for every size of joist on the market thereby resulting in very high tooling costs to manufacture a complete range and also a large  
 25 range of product stock must be held.

It is an aim of preferred embodiments of the invention to solve or reduce at least one of the above mentioned problems.

30 According to a first aspect of the invention, there is provided a joist hanger comprising a shoe for receiving and at least partially enclosing an end portion of an elongate joist; and a flange extending from the shoe,



wherein, the shoe is arranged, in use, to be built into a supporting structure of a building.

Preferably, the shoe comprises planar lower surface, two planar side surfaces which are inclined approximately perpendicular to the lower surface and a planar upper surface distal to the lower surface and inclined approximately parallel to the lower surface.

Preferably, the shoe additionally comprises an end surface so that the shoe defines an open chamber or enclosure having a mouth into which an end of a joist may be inserted.

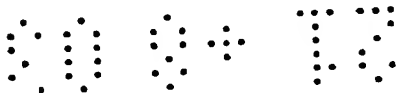
The shoe is preferably arranged, in use, such that a lower surface thereof sits on the supporting structure and loads carried by the joist are largely transmitted to the supporting structure through said lower surface. Preferably, in use, the supporting structure is built up around the outer periphery of the shoe, to box the shoe into position.

The joist hanger is preferably arranged, in use, to have the shoe embedded within the supporting structure and the flange abutting an outer/inner surface of the supporting structure.

The supporting structure is preferably a wall.

Preferably, the flange is arranged, in use, to sit flush against the supporting structure as a means of locating the joist hanger with respect to an inner/outer face of the supporting structure.

Preferably, the flange extends from an outer periphery of the shoe. In most arrangements, the flange preferably extends at right angles from the points at which it joins the outer periphery of the shoe.



The shoe may comprise thermally insulating material. The shoe may be formed of plastics material. Alternatively, it could be formed of steel or timber.

- 5        The shoe may be formed of a metal, or composite material and may further comprise a lining of thermally insulating material.

10       The flange may comprise fixings, or openings may be defined by the flange for receiving fixings, for mounting the joist hanger system against an inner or outer face of the supporting structure.

Preferably, the shoe is sized to receive a standard size of joist within it.

- 15       There are a number of different forms of floor joist used in construction, the main three types being:

- i) Traditional rectangular solid sawn timber;
- ii) Engineered timber "I" shaped joists comprising a narrow web and rectangular top and bottom flanges; and
- 20       iii) Engineered timber truss joists comprising rectangular timber top and bottom flanges which are spaced apart by a lattice work of metal webs.

25       Preferably, an embodiment of a hanger according to the invention can accommodate any of these. Thus, preferably, an embodiment of a hanger according to the invention comprises a number of features that enable a range of joist types and sizes to be accommodated.

30       Preferably an embodiment of a hanger according to the invention includes integral internal shaping spaced to accommodate a web of an "I" shaped joist which can be selected from a group of joists having varying overall heights and flange widths. Integral shaping can be of various forms and configurations. For example it may comprise two or four



opposing projections, optionally which are solid and/or have two arms. In a preferred embodiment the projections have an outer skin reinforced by a lattice of members. The lattice may be rectangular and/or triangular and it may comprise a plurality of members.

5

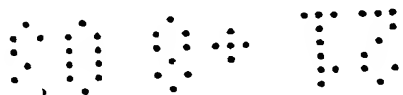
Preferably an embodiment of a hanger according to the invention includes separate spacer elements that can be located between the inner side surface of the hanger and a web of an "I" shaped joist. Separate spacer elements can be of a variety of shapes and/or configurations.

10 Preferably they can be positioned in various predetermined vertical positions for accommodating an "I" joist selected from various sizes of "I" joist.

Preferably an embodiment of a hanger according to the invention has  
 15 projections and/or channels and/or castellations and/or slots in at least one of the side surfaces of the shoe which are complimentary with projections and/or channels and/or castellations and/or slots in at least one of the side surfaces of the separate spacer elements. This provides the advantage of allowing separate spacer elements to slide into position  
 20 and provide engagement whilst aiding prevention of vertical slip of the spacer. The slots are rectangular and/or dovetailed in sectional shape. Preferably spacer elements have side projections which are complimentary with slots in the shoe of a hanger according to an embodiment of the invention. Alternatively, preferably the spacer elements have slots and  
 25 side projections extend from the side surfaces of the shoe which are complimentary with the slots.

Preferably an embodiment of a hanger according to the invention comprises separate spacer elements which have slits within their profile to  
 30 facilitate cutting to predetermined vertical dimensions.

Preferably an embodiment of a hanger according to the invention comprises separate spacer elements of rectangular cross section for

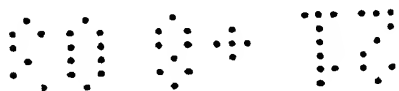


providing spacers between the shoe and the side of solid sawn rectangular joists or the top or bottom flanges of composite joists.

Preferably an embodiment of a hanger according to the invention  
 5 comprises a shoe having at least one rib in at least one outer face of the shoe for providing a key with mortar within a wall. Preferably, the shoe has a plurality of ribs and preferably they are provided at a variety of angles. The ribs are preferably perpendicular or parallel to the flange of the hanger and/or inclined at an angle between perpendicular or parallel to  
 10 the flange of the hanger.

Preferably an embodiment of a hanger according to the invention includes bearing flanges which extend parallel or perpendicular to the upper and/or lower surfaces of the shoe to provide a surface area for  
 15 bearing onto a wall. This provides the advantage of increasing the temporary stability of a joist during construction.

Preferably an embodiment of a hanger according to the invention includes a shoe that is tapered in width from the mouth to the end surface.  
 20 The taper provides the advantage of allowing the gap between separate spacer pieces to increase or decrease as they move out of or into the hanger respectively. This enables different widths of web or flange to be accommodated with the same spacer piece. It also takes account of tolerance in the dimensional width of a joist and allows spacer elements to  
 25 be tightly wedged against a joist as they are driven into the hanger. Alternatively, separate spacer elements can be attached to the top and/or bottom of the joist as shown typically in Figure 6. In this example the spacer elements have the same width as the internal width of the hanger. The spacer elements can have parallel or tapered sides depending on  
 30 whether the shoe and hanger is tapered from the mouth to the end surface.





Preferably an embodiment of a hanger according to the invention includes a series of break out/removable sections in the side flanges to allow the passage of restraint straps which may be needed to connect a wall to a joist.

5

Preferably an embodiment of a hanger according to the invention includes a strap detail for connecting a joist to the hanger. This provides the advantage of lateral restraint.

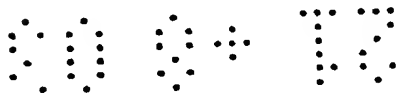
10 Preferably an embodiment of a hanger according to the invention includes a removable slot in the lower surface of the shoe to allow passage of a restraint strap.

15 Preferably an embodiment of a hanger according to the invention has an "I" shape and according to this embodiment the mouth of the hanger defines an "I" shape. This provides the advantage that the hanger is capable of accommodating particular "I" shaped joist sizes.

20 A second aspect of the invention provides a method of hanging a joist comprising placing a joist hanger according to the first aspect over an end region of the joist and, thereafter, positioning the end region of the joist and the now associated joist hanger directly onto the supporting structure, such that a lower surface of the joist hanger sits on the supporting structure and the flange of the joist hanger sits flush against a side surface  
25 of the supporting structure.

Preferably, mortar is applied between the lower surface of the joist hanger and the supporting structure.

30 Preferably, the supporting structure is built up around the joist hanger.



Prior to associating the end region of the joist and the joist hanger, a thermally insulating sock is preferably placed over the end of the joist.

A third aspect of the invention provides a method for hanging joists, wherein a joist hanger according to the first aspect is first associated with a supporting structure of a building and, subsequently, an end region of a joist is positioned within the joist hanger.

The joist hanger may be provided as part of a prefabricated unit of a supporting structure.

The joist hanger and the supporting structure may be integrally formed.

Another aspect provides a method of hanging joists, wherein a joist hanger according to the first aspect is placed over an end region of a joist and passed into a gap formed in a supporting structure, the joist hanger being positioned such that a lower surface thereof sits on part of the supporting structure and the gap around the shoe is subsequently closed by building up the supporting surface around the joist hanger.

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 illustrates a hanger according to the invention including integral internal shaping spaced to accommodate a web of an "I" shaped joist;

30

Figure 2 illustrates an embodiment of a hanger according to the invention including separate spacer elements located between the inner side surface of the hanger and a web of an "I" shaped joist;

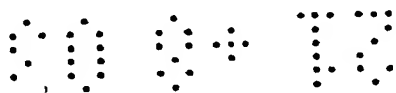


Figure 3 illustrates an embodiment of a shoe of a hanger according to the invention having slots which are complimentary with projections of separate spacer elements;

5

Figure 4 illustrates an embodiment of separate spacer element of a hanger according to the invention having projections which are complimentary with slots of a shoe. The separate spacer elements has slits within its profile to facilitate cutting to predetermined vertical dimensions;

10

Figure 5 illustrates separate spacer elements of rectangular cross section for providing spacers between the shoe and the side of solid sawn rectangular joists or the top or bottom flanges of composite joists;

15

Figure 6 illustrates separate spacer elements attached to the top and/or bottom of a joist. In this example the spacer elements have the same width as the internal width of the hanger;

Figures 7 and 8 illustrate typical construction details using a hanger according to an embodiment of the invention;

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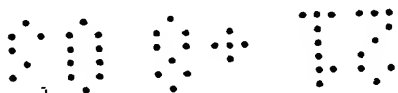
Figure 9 illustrates a prior art joist hanger.

Referring to Figures 1 to 8, a joist hanger in accordance with an embodiment of the present invention will now be described.

25

Joist hanger 100 comprises a shoe 200 and a shoe flange 300. The shoe 200 comprises a 5-sided box structure comprising upstanding side surfaces 210, 220, an end surface 230, upper surface 240 and lower surface 250. The shoe 200 forms an enclosure having a mouth 400 into which the end of a joist may be inserted to be enclosed by the shoe 200.

30



The shoe flange 300 is shown here as comprising a plate which extends from a periphery of the shoe 200, as defined by the edges of the mouth region 400 formed by end regions of surfaces 210, 220, 240, 250. The shoe flange 300 also has mounting holes 310A-D formed therein.

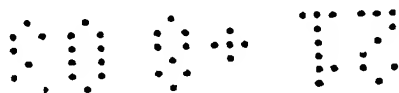
5

The joist hanger 100 receives the end of a joist 500 therein. Here, it will be noted that the joist 500 may be of a standard size or construction, for instance, an I-beam construction, and the shoe 200 of the joist hanger 100 is sized appropriately to receive such a standard sized joist 500 therein. An insulating sock 600 can be positioned at the interface between the joist 500 and the shoe 200 of the joist hanger 100. This insulating sock 600 is an optional feature and may be used to further minimise thermal bridging effects and improve air tightness.

The joist hanger 100 is supported by an underlying layer of brickwork 700 and mortar 800. It will be appreciated that the joist hanger 100 is also supported at the sides thereof by brickwork which is built up around side surfaces 210, 220 of the shoe and also supported to a certain extent by layers of brickwork 700 which are subsequently laid above the level of the shoe 200. To the rear of the shoe 200, behind back surface 230 and behind layers of brickwork 700 there is also shown cavity insulation 900. Such insulation will be present where, for instance, a cavity wall is present and the joist 500 is desired to extend from inner leaf of that cavity wall.

Mounting openings 310A-D in conjunction with appropriate screw fixings or similar provide an additional means of fixing the joist hanger to the supporting structure and may help to anchor it in position while mortar dries around the hanger 100.

Integral internal shaping is spaced to accommodate a web of an "I" shaped joist which can be selected from a group of joists having varying overall heights and flange widths. Integral shaping comprises two or four opposing projections, which are solid and/or have two arms. In a



preferred embodiment the projections have an outer skin reinforced by a lattice of members. The lattice is rectangular and/or triangular and it comprises a plurality of members.

5        Separate spacer elements are located between the inner side surface of the hanger and a web of an "I" shaped joist. Separate spacer elements are of a variety of shapes and/or configurations. The spacer elements have projections and slots are located in the side surfaces of the shoe that are complimentary with the slots. In addition, the spacer elements have  
10        slits within their profile to facilitate cutting to predetermined vertical dimensions. In use, the separate spacer elements can be of rectangular cross section for providing spacers between a shoe and the side of solid sawn rectangular joists or the top or bottom flanges of composite joists.

15        Ribs in the outer faces of the shoe provide a key with mortar within a wall. The ribs are parallel to the flange of the hanger.

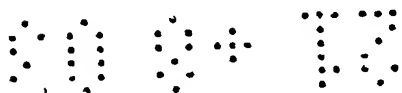
Bearing flanges extend parallel to the upper and/or lower surfaces of the shoe to provide a surface area for bearing onto a wall.

20

~~Separate spacer elements can be attached to the top and/or bottom of the joist.~~ They have the same width as the internal width of the hanger.

25        A series of break out/removable sections in the side flanges allow the passage of restraint straps which may be needed to connect a wall to a joist. Alternatively, or in addition, a strap detail can be included for connecting a joist to the hanger. A removable slot in the lower surface of the shoe can be included to allow passage of a restraint strap.

30        It will be appreciated that many different methods are possible for installing the joist hanger 100 into a particular location.



In a first method, opposed end regions of a joist 500 may be inserted into respective shoes 200 of joist hangers 100 at either end (with or without the optional insulating sock 600 being placed over each end of the joist 500 first). Then, with the joist and joist hangers already associated  
 5 with one another, the joist hangers 100 may be placed directly onto supporting brickwork 700 and fixed in position by building up brickwork 700 around them, with mortar 800 etc.

In a second possible method, joist hangers 100 may be provided  
 10 already positioned within a supporting structure of a building and the end region of a joist 500 may thereafter be offered up to the mouth region 400 and inserted into the shoe 200. In other circumstances, it may be possible feed joists 500 and joist hangers 100 through gaps in a partially formed wall, to place them in position and then build up extra brickwork around.  
 15 Other methods or partial combinations of the aforementioned methods will occur to a man skilled in the art and are encompassed by the teachings of this invention.

It will be appreciated that there are many different variations of joist  
 20 hanger which may be envisaged incorporating the teachings of the present invention.

In one possible variation, it will be appreciated that the shoe flange  
 300 need not necessarily extend from an end region of the surfaces 210,  
 25 220, 240, 250 of the shoe 200 and that the flange may extend outwardly from those surfaces, at a distance between end edges thereof, so that the shoe portion 200 extends beyond the flange 300. Also, it will be appreciated that for certain architectural details, such as for use within sloping walls, the flange 300 need not be provided at right angles to the  
 30 main extent of the shoe 200, it being sufficient to ensure that the flange 300 is angled to be flush with an inner (or outer, where appropriate) surface of the supporting structure of the building of which the joist hanger 100 is to form a part.



It will also be appreciated that the above mentioned system could be used in prefabricated buildings, with the joist hangers already provided as an integral part of a preformed wall.

5

In particularly preferred arrangements, the joist hangers are made from a durable plastics material with good thermal insulating properties. In such a case, the use of a separate insulating sock may be redundant. It will also be appreciated that the joist hangers 100 may be formed of any particular suitable material, such as a metal material.

10

Although the shoe portion is described as enclosing the end part of a joist, it will be appreciated that there may be gaps or holes formed in the joist hanger such that the shoe only partially encloses the joist end.

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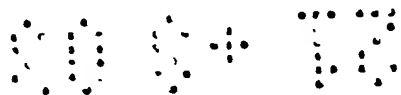
Wherever brickwork is referred to in this description, the skilled man will realise that such a term is used by way of example only and that other forms of supporting structure may be used in conjunction with the joist hangers.

20

It will be appreciated that the invention as described solves or reduces many of the problems of the prior art. Providing the hanger from insulating material or from a metallic constructions used with a thermal sock reduces thermal bridging problems. The at least partial enclosing nature of the joist hanger provides better air-tightness. Providing the support by effectively load transmitting directly onto a supporting structure of the building means that the very close tolerances on the length of the joist are no longer needed and providing shoes to fit standard cross-section joists provides a convenient hanging system.

25

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this



specification, and the contents of all such papers and documents are incorporated herein by reference.

5 All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

10 Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent  
15 or similar features.

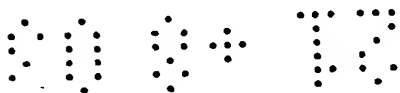
The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any  
20 accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.





**CLAIMS**

1. A joist hanger comprising a shoe for receiving and at least  
5 partially enclosing an end portion of an elongate joist; and a flange  
extending from the shoe, wherein, the shoe is arranged, in use, to be built  
in to a supporting structure of a building.
2. The joist hanger of claim 1, wherein the shoe is arranged, in use,  
10 such that a lower surface thereof sits on the supporting structure and loads  
carried by the joist are largely transmitted to the supporting structure  
through said lower surface.
3. The joist hanger of claim 1 or 2, wherein in use, the supporting  
15 structure is built up around the outer periphery of the shoe, to box the  
shoe into position.
4. The joist hanger of claim 1, 2, or 3, wherein the joist hanger is  
preferably arranged, in use, to have the shoe embedded within the  
20 supporting structure and the flange abutting an outer/inner surface of the  
supporting structure.
5. The joist hanger of claim 1, 2 3 or 4, wherein the flange is  
arranged, in use, to sit flush against the supporting structure as a means  
25 of locating the joist hanger with respect to an inner/outer face of the  
supporting structure.
6. The joist hanger of any preceding claim, wherein the flange  
extends from an outer periphery of the shoe.
- 30 7. The joist hanger of claim 6, wherein the flange extends  
substantially at right angles from the points at which it joins the outer  
periphery of the shoe.



8. The joist hanger of any preceding claim, wherein the shoe is sized to receive a standard size of joist within it.

5 9. The joist hanger of any preceding claim, wherein the joist hanger comprises thermally insulating material, for example plastics material.

10. The joist hanger of any of claims 1 to 8, wherein the joist hanger is formed of a metal or compost material.

10

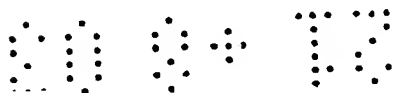
11. The joist hanger of claim 10, further comprising a lining of thermally insulating material.

12. The joist hanger of any preceding claim, wherein the flange  
15 comprise holes or other fixings for mounting the joist hanger system against an inner or outer face of the supporting structure.

13. The joist hanger of any preceding claim, wherein the shoe includes integral internal shaping spaced to accommodate a web of an "I" shaped joist which can be selected from a group of joists having varying  
20 overall heights and flange widths.

14. The joist hanger of any preceding claim, which includes separate spacer elements that can be located between the inner side surface of the  
25 shoe and a web of an "I" shaped joist.

15. The joist hanger of any preceding claim, wherein projections and/or channels and/or castellations and/or slots in at least one of the side surfaces of the shoe which are complimentary with projections and/or  
30 channels and/or castellations and/or slots in at least one of the side surfaces of the separate spacer elements.



16. The joist hanger of claim 14 or 15, wherein the separate spacer elements which have slits within their profile to facilitate cutting to predetermined vertical dimensions.

5 17. The joist hanger of any one of claims 14 to 16, wherein the separate spacer elements have a rectangular cross section for providing spacers between the shoe and the side of solid sawn rectangular joists or the top or bottom flanges of composite joists.

10 18. The joist hanger of any preceding claim, wherein at least one rib is positioned in at least one outer face of the shoe for providing a key with mortar within a wall.

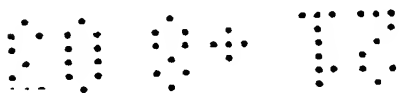
15 19. The joist hanger of any preceding claim, wherein bearing flanges extend parallel or perpendicular to the upper and/or lower surfaces of the shoe to provide a surface area for bearing onto a wall.

20 20. The joist hanger of any preceding claim, wherein the shoe is tapered in width from the mouth to the end surface for allowing the gap between separate spacer pieces to increase or decrease as they move out of or into the hanger respectively.

25 21. The joist hanger of any one of claims 14 to 20 wherein separate spacer elements for attachment to the top and/or bottom of a joist.

30 22. The joist hanger of any preceding claim, wherein a series of break out/removable sections is provided in the flanges to allow the passage of restraint straps which may be needed to connect a wall to a joist.

23. The joist hanger of any preceding claim, wherein a strap detail is included for connecting a joist to the hanger.



24. The joist hanger of any preceding claim, wherein a removable slot is positioned in the lower surface of the shoe to allow passage of a restraint strap.

5 25. A method of hanging a joist comprising placing a joist hanger according to any of the preceding claims over an end region of the joist and, thereafter, positioning the end region of the joist and the now associated joist hanger directly onto the supporting structure, such that a lower surface of the joist hanger sits on the supporting structure and the  
10 flange of the joist hanger sits flush against a side surface of the supporting structure.

26. The method of claim 25, wherein mortar is applied between the lower surface of the joist hanger and the supporting structure.

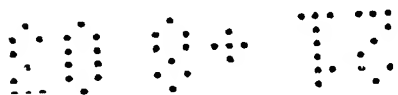
15 27. The method according to claim 26, wherein the supporting structure is built up around the joist hanger.

28. The method according to claim 27, wherein prior to associating  
20 the end region of the joist and the joist hanger, a thermally insulating sock is placed over the end of the joist.

29. A method for hanging joists, wherein a joist hanger according to any of claims 1 to 24 is first associated with a supporting structure of a  
25 building and, subsequently, an end region of a joist is positioned within the joist hanger.

30. The method of claim 29, wherein the joist hanger is provided as part of a prefabricated unit of a supporting structure.

30 31. The method of claim 30, wherein the joist hanger and the supporting structure are integrally formed.

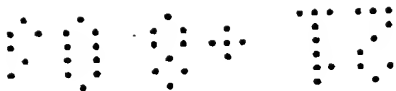


32. A method of hanging joists, wherein a joist hanger according to any of claims 1 to 24 is placed over an end region of a joist and passed into a gap formed in a supporting structure, the joist hanger being positioned such that a lower surface thereof sits on part of the supporting  
5 structure and the gap around the shoe is subsequently closed by building up the supporting surface around the joist hanger.

33. A joist hanger substantially as herein described with reference to figures 1 to 8 of the accompanying drawings.

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34. A method of hanging a joist, the method being substantially as herein described with reference to figures 1 to 8 of the accompanying drawings.





INVESTOR IN PEOPLE

Application No: GB 0310590.5  
Claims searched: 1-20 and 22-34

Examiner: Joanne Pullen  
Date of search: 1 October 2003

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X, Y	X 1-10, 18, 19 25-27, 29 & 32 Y 11, 13, 14-17 & 28	GB 1564752 A	(GRINDROD) Figures 1 and 2, page 1 lines 44-53, 64-72, 80-90, page 2 lines 5-8, 73-76.
X, Y	X 1-9, 12, 29 & 30 Y 11, 13, 14-17 & 28	US 5806274 A	(JPL ENTERPRISES) Whole document.
X, Y	X 1-8, 10, 12, 18, 19, 25-27, 29 & 32 Y 11, 13, 14-17 & 28	US 2176450 A	(BARNETT) Figures and page 1 lines 15-33, page 2 lines 49-52, 62-70.
X	1, 5-8, 10, 12, 13, 25, 29 & 30	JP 8296275 A	(MATSUSHITA) Abstract and figures.
Y	14-17	US 4893961 A	(TRUS JOINT CORP.) Figure 4, column 3 lines 1-5, 36-39.
Y	13	US 4411548 A	(P H BOWMAN CO) Figures 1 and 2 and column 4 lines 49-63.
Y	13	US 3989398 A	(U.S. GYPSUM CO) Figures 1 and 5 and column 3 lines 32-37.
Y	11 & 28	GB 2130616 A	(SYMCOX) Whole document
Y	11 & 28	GB 525650 A	(KEILLOR) Whole document

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**Application No:** GB 0310590.5  
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**Examiner:** Joanne Pullen  
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<input checked="" type="checkbox"/> X	Document indicating lack of novelty or inventive step	<input type="checkbox"/> A	Document indicating technological background and/or state of the art.
<input type="checkbox"/> Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	<input type="checkbox"/> P	Document published on or after the declared priority date but before the filing date of this invention.
<input type="checkbox"/> &	Member of the same patent family	<input type="checkbox"/> E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>v</sup>:

E1D DPC

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

E04B

The following online and other databases have been used in the preparation of this search report:

Online: epodoc, wpi, japio

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